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Nuclear power development: meeting the world's energy needs and fulfilling article IV

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1. In the past few years, nuclear power has generated renewed interest as a way of meeting the world's energy needs, as shown inter alia by the Paris conference in 2005,[1] the Beijing conference in April 2009,[2] and the resolutions on nuclear power applications adopted since 2006 by the General Conference of the International Atomic Energy Agency.[3] These new perspectives are highly relevant to the implementation of the Treaty on the Non-Proliferation of Nuclear Weapons. Indeed, power applications are an essential part of the peaceful uses of nuclear energy foreseen in article IV, and international cooperation in this field is a major component of the implementation of the Treaty. A large number of countries strongly support the development of peaceful uses for power and other applications, and are committed to working towards the fullest implementation of article IV.

2. The Treaty acknowledges the inalienable right to develop research, production and use of nuclear energy for peaceful purposes, in conformity with articles I and II of the Treaty. This underscores the importance of strict observance of article III in order to ensure compliance with articles I and II and the overarching non-proliferation objectives of the Treaty. Exercising the right to the benefits of nuclear energy must be available to all States pursuing in good faith a nuclear programme for peaceful purposes in accordance with their international obligations.

[1] International Ministerial Conference on Nuclear Power for the twenty-first Century, Paris, 21-22 March 2005.

[2] International Ministerial Conference on Nuclear Energy in the twenty-first Century, Beijing, 20-22 April 2009.

[3] GC(50)/RES/13, sect. B, GC(51)/RES/14, sect. B.1 and GC(52)/RES/12, sect. B.1.

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Growing world energy needs

3. A dramatic increase is foreseen in world energy needs in the twenty-first century. Meeting these needs is essential, as energy supply is a condition of the world's sustainable development, and particular consideration must be given to the needs of developing countries. In this perspective, a diverse portfolio including all energy sources and, in particular, the responsible use of nuclear energy will be needed to allow access to sustainable energy and electricity resources in all regions of the world.

4. At the same time, the essential need to ensure sustainable development of the world is more and more widely recognized as an absolute priority. The health of the planet's environment and energy security are serious concerns. Managing global environment issues in a sustainable manner, including by curbing air pollution and addressing the risk of climate change, must be regarded as a priority by all Governments.

The potential of nuclear technology to meet world energy needs

5. The renewed growth of nuclear power and interest in its potential to help meet the world's energy needs have been broadly recognized, inter alia in the IAEA General Conference resolutions and in the concluding statement of the Beijing Conference, which affirmed that nuclear energy, as a proven, clean, safe, competitive technology, would make an increasing contribution to the sustainable development of humankind throughout the twenty-first century and beyond. Many countries have been conducting nuclear power programmes for several decades, as a result of which nuclear power currently provides 16 per cent of world electricity supply, and they have undertaken to pursue the development of their capacities and to promote the worldwide development of nuclear power to meet energy needs.

6. In addition, nuclear power receives increasing interest from a number of countries currently without nuclear power, which have plans for or are considering developing their use of this energy source. In particular, many developing countries see nuclear power as a useful option in their energy mix to diversify sources of supply and enhance security in support of their socio-economic development.

7. The Paris and Beijing conferences and the General Conference resolutions have also recognized that nuclear power can make a crucial input to the sustainable development strategies of many countries, as nuclear power does not generate air pollution or greenhouse gas emissions.

8. In addition to electricity production, water desalination can be an important resource for countries facing problems of supply of potable water, and nuclear production of hydrogen offers a major potential for the development of hydrogen-based systems.

9. Nuclear power is an advanced and proven technology, with a record of safe and reliable production and improving performance. It enjoys a robust industrial and market base, with industrial companies from many countries in all regions of the world involved in global energy technology markets. The market for equipment and fuel is diversified and effective. In particular, the uranium market is based on a diversified geographical base, which includes developing countries.

10. Nuclear power is economically competitive under many circumstances. It contributes to the stability of energy prices and reduces dependence on fluctuating fossil fuel prices, as fuel and operating expenses represent a smaller part of the total cost of nuclear power, as compared with other energy sources. Nuclear power is a long-term investment for sustainable development, and its financing must be considered from this perspective. In particular, nuclear power should be given equal access to international financing mechanisms supporting sustainable socio-economic development.

The framework for nuclear energy development

11. The development of nuclear energy takes place in a robust international framework, in which the Treaty and the adherence to international norms play a central role. For the responsible development of nuclear energy, non-proliferation, safeguards, safety and security must be issues of primary importance.

12. It must proceed in a manner ensuring non-proliferation objectives and international peace and security. Article IV of the Treaty provides a framework for meeting these objectives. The exercise by a non-nuclear-weapon State of its right to develop the activities necessary to enjoy the benefits of nuclear power is subject to the respect of its non-proliferation commitments under articles I, II and III of the Treaty and to the pursuit in good faith of peaceful purposes.

13. As proliferation risks and non-compliance situations are a major challenge today in the implementation of the Treaty, preventing proliferation must be a paramount priority for all parties. The IAEA safeguards have played a central role in ensuring the compliance of States with their non-proliferation obligations, and it is therefore essential to the sustained utilization of nuclear energy that IAEA maintain effective safeguards on nuclear material and activities of States. States should also pay due attention to export control of nuclear material, equipment and technology and exert particular vigilance with regard to sensitive nuclear material, equipment and technology with proliferation potential.

14. In order to maintain the highest nuclear safety levels, all States having or developing a nuclear power programme should give due consideration to nuclear safety and, in particular, to the application of the IAEA safety standards. They should take into account the importance of international cooperation for the enhancement of the nuclear safety regime and of nuclear safety worldwide and, in this regard, adhere to the international safety conventions concluded under the auspices of IAEA.

15. As nuclear security is a national responsibility, all States must make the necessary arrangements to ensure the highest level of security of nuclear material and facilities. They should also give a high priority to international cooperation, which provides common references and benchmarks and facilitates capacity-building and continual enhancement, in particular through adhering to the Convention on the Physical Protection of Nuclear Material.

16. The development of nuclear power must take due account of public acceptance issues and be carried out in a manner that addresses the expectations and concerns of citizens.

17. Solutions exist for the safe and secure management of spent fuel and radioactive waste, and research and development is under way for improved

solutions. States have an obligation and responsibility to ensure, from the earlier phases of their nuclear programmes, that appropriate options are provided for the management and disposition of nuclear fuel and must ensure that using nuclear power does not create undue burdens or risks for future generations.

18. International research and development programmes are currently carried out to develop innovative nuclear systems, which are providing increased benefits with respect to economy, safety, waste management and non-proliferation. They can and should bear in mind sustainable development and provide answers to the needs and concerns of society, taking into account the specific situation of each State. The development of new reactor and fuel cycle designs should give due attention to safety, security and proliferation resistance.

National infrastructure for the introduction and development of nuclear energy

19. The responsible and efficient introduction of nuclear power in a country is a major undertaking. To proceed adequately in the framework described above, it must be based on a comprehensive strategy and requires the establishment of appropriate and sustainable national infrastructure to provide the necessary organizational, legal, regulatory, human, technological, industrial and financial framework. To capture the best practices resulting from experience acquired throughout the world, infrastructure guidelines have been developed by IAEA and are well described in its document *Milestones in the Development of a National Infrastructure for Nuclear Power*.[4] Such infrastructure is required to ensure the safe, secure, peaceful, efficient and sustainable application of nuclear power for the benefit of the country and the confidence of the international community.

20. The development of the required infrastructure is a national responsibility that cannot be transferred. However, international cooperation can provide valuable support in this undertaking and should be developed to the largest extent possible between interested countries. It is in particular of great value to help train the necessary workforce. The countries submitting this paper are ready to cooperate in the development of the necessary infrastructure to support the introduction of nuclear power for peaceful purposes.

Furthering the application of nuclear technology to meet energy needs and fulfil article IV

21. International cooperation is central to the development of nuclear energy. As regards bilateral cooperation, many countries are engaged in intense international cooperation through a large number of cooperation agreements.

22. Widespread international cooperation is carried out through various international organizations and programmes, including the Nuclear Energy Agency of the Organization for Economic Cooperation and Development, the European Union and programmes such as those conducted under the Generation IV International Forum and the International Thermonuclear Experimental Reactor project.

[4] IAEA Nuclear Energy Series No. NG-G-3.1, 2007.

23. International initiatives have been launched to foster the development of nuclear energy to meet growing energy needs. One such initiative, the Global Nuclear Energy Partnership, comprises 25 countries sharing a common vision of the sustainable, safe and secure expansion of nuclear energy for peaceful purposes. It aims to accelerate the development and deployment of advanced nuclear systems, to facilitate the development of national infrastructure and to establish a reliable fuel assurance framework.

24. The International Ministerial Conference on Nuclear Energy in the twenty-first Century, held from 20 to 22 April 2009 in Beijing, provided the opportunity to review at a high level the status and rising expectations related to nuclear energy and the conditions for its development in developed and developing countries, and to discuss actions to carry forward the current positive momentum.

25. Vendors and buyers have a common interest and responsibility in the sustainable development of nuclear energy. States should encourage them to pursue active exchanges throughout the life cycle of a nuclear power plant.

26. IAEA plays a central role in international cooperation for the application of nuclear energy, according to its statutory role "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world". IAEA programmes provide a key contribution to promoting and fostering the efficient, safe and secure development and use of nuclear energy for peaceful purposes through international cooperation, including:

(a) By providing global energy analyses that contribute to the objective of fostering sustainable development and protecting the environment and to a greater understanding and a well-balanced picture of the role of nuclear science and technology in a global, sustainable development perspective;

(b) By contributing, in that connection, to the availability of required sources for financing nuclear projects;

(c) By providing support to its member States for the establishment of their national infrastructure for the introduction and development of nuclear power. The IAEA General Conference has adopted resolutions[5] supporting activities in this area, and IAEA has developed a broad range of services to its member States. A large number of them have requested such support, including through technical cooperation projects;

(d) In the continual improvement of nuclear power plant operation, as the principal international forum for the exchange of information and experience in this field among member States and international organizations, such as the Nuclear Energy Agency of the Organization for Economic Cooperation and Development, and non-governmental organizations such as the World Association of Nuclear Operators;

(e) In promoting improvements and advances in nuclear power, fuel cycle and waste technology, in particular through the International Project on Innovative Nuclear Reactors and Fuel Cycles;

[5] GC(49)/RES/12, sect. G, GC(50)/RES/13, sect. B.2 and GC(51)/RES/14, sect. B.1.

(f) In the continual improvement of nuclear safety through the development of safety standards and the review processes of international conventions and cooperative programmes;

(g) In promoting high-level exchanges on and assessment of the contribution of nuclear power to the satisfaction of energy needs, in particular through high-level conferences.

27. In response to the numerous requests received from States interested in starting a nuclear power programme, IAEA also provides major support in energy planning and the evaluation of energy options, in the evaluation of needs and requirements of these States and in the establishment of appropriate technical, human, legal and administrative infrastructure for the development of nuclear power.

28. The technical cooperation programme of IAEA is a key vehicle to provide broad support to developing member States with respect to nuclear power and other applications.

29. Another key issue for international cooperation is how best to provide a framework for the development of nuclear energy applications in a safe, secure and proliferation-resistant manner while reflecting economic reality and the real needs of the recipient countries. With respect to assurances of supply of nuclear fuel and services, in order to complement the high level of security already provided by current market mechanisms, customers should be provided with long-term nuclear fuel supply arrangements, and international efforts should be pursued to establish credible multilateral fuel supply assurances. Various proposals for such assurances have recently been developed, some of which are expected to be considered by the IAEA Board of Governors in the near future.

Conclusion

30. Nuclear applications make a key contribution to sustainable human development objectives through a broad range of benefits in energy supply, food and agriculture, health and medicine and industrial activities.

31. The responsible, sustainable and efficient development of nuclear energy must be carried out in an adequate framework, where safety, security and safeguards are essential elements, and such a framework must be based on effective national infrastructure.

32. Nuclear power has the opportunity to make a major contribution to the satisfaction of national and world energy needs. Beyond being a common undertaking of all States parties to the Treaty, the promotion of the applications of nuclear power is crucial to meeting the challenge of providing sufficient and reliable energy to support the world's sustainable development, for the benefit of all. It lies at the very heart of the vision that was the basis for "Atoms for Peace" and for the Treaty.

33. In that context, international cooperation is an essential element of the development of peaceful uses of nuclear energy, as was foreseen in article IV and supported by strict observance of the obligations contained in articles I, II and III of the Treaty. The countries submitting this paper are committed to engaging in the fullest implementation of article IV. They encourage, support and participate in intense international cooperation to achieve the goals of the Treaty.